BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Cognitive Radio Technologies and	)	ET Docket No. 03-108
Software Defined Radios	)	ET Docket No. 00-47

COMMENTS BY RAYTHEON

May 3, 2004

Raytheon is submitting these comments in response to the solicitation for information in the NPRM dated December 17, released December 30, 2003 and published February 17, 2004.

Raytheon is an industry leader in defense and government electronics, space, information technology, technical services, and business aviation and special mission aircraft. In these comments, Raytheon applauds the FCC's initiative to move towards a more flexible, efficient and reliable spectrum access policy. We specifically endorse the use of cognitive radio technologies for both licensed and unlicensed devices, and provide comments on some of the paragraphs in the NPRM.

- Raytheon supports the FCC's initiative to move to more flexible spectrum access policy. More flexible access to spectrum will relieve the "spectrum bottleneck" and create new opportunities for technical and economic innovation in wireless communications. We also concur in the observations regarding the relationship of cognitive radios with software defined radios, and that the FCC should avoid over-regulating, to avoid limiting the potential of cognitive radios.

- Based on our experience in defense and government electronics, we believe that cognitive radio technology exists today to develop and demonstrate a radio that avoids harmful interference while dramatically increasing the access to and efficient use of spectrum; and that in mass commercial production, the benefits of cognitive radio technology will be achieved in an efficient and affordable economic model, and will spur the next round of dynamic growth in wireless communications. The spectrum sensing technology has existed for a long time and is now reliable and affordable, and the cognitive processing technology has recently matured to the point where it is now feasible to incorporate it into commercial wireless systems.

- Cognitive radio technology can enable the many suggested applications, including rural markets for unlicensed devices, secondary markets, dynamic coordination, interoperability and mesh networks. Cognitive radio technology capabilities of frequency agility, adaptive modulation, transmit power control, geolocation, spectrum

sharing and coordination techniques, advanced security features, and interference avoidance will enable these and many other applications.

- We concur in the need for experimental spectrum to demonstrate the effectiveness and the reliability of cognitive radio, particularly in regard to interference avoidance.

- Concerning security, the Commission is correct in recognizing that cognitive and software-defined radios are more vulnerable to security threats. Although this raises a concern about over-regulation, certification of security protection commensurate with the threat and risk in the market, should be required for cognitive and software defined radios. Concerning transmit-only modules, the same rules regarding security certification should be applied here as for full transmit-receive radios.

- Concerning regulation of computer technology, we believe existing rules and regulations are adequate. No new rules or regulations regarding unintentional emissions are needed in this area.

- Today's manual spectrum management techniques typically use conservative path loss models (i.e., free space) and large margins to calculate the worst-case potential interference between neighboring systems in frequency and/or geography with certain assumptions regarding radio technical parameters and locations. Cognitive radio technology can enable moving this frequency coordination function from a pre-planning licensing activity to a real-time function of the radio attempting to access the spectrum. In this manner, the radio systems can manage their own use of the spectrum using the real-time measured path loss isolation between actively transmitting systems in place of conservative path loss models that assume worst-case potential interference conditions. The result will be much greater spectrum access, and much greater spectrum use efficiency.

- Future adaptive access to the spectrum should not be limited to contiguous waveforms. A radio that adapts its operating frequency to access unused spectrum would be further enhanced by adapting its signal-in-space waveform format in a manner that facilitates access to broader and broader bandwidths. This includes discontiguous operation that incorporates frequency excision to avoid causing interference in occupied bands. We recommend that the implementation of cognitive radio technology specifically consider this type of operation so that use of these advanced adaptive waveforms is not precluded in the future.

Respectfully Submitted,
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May 3, 2004